MATHEMATICS TEACHER EDUCATORS' REFLECTIONS ON THEIR OWN PRACTICE OF EQUITY AND JUSTICE WITH TEACHER CANDIDATES

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Abstract. We are three mathematics teacher educators (MTEs) at a Hispanic serving institution that predominantly teach mathematics education courses for elementary and secondary teacher candidates (TCs). In this paper, we present findings from a collaborative self-study in which we used dimensions of the Rehumanizing Mathematics (RM) framework (Gutiérrez, 2018), to situate and integrate our work across mathematics content and methods courses. Our diverse cultural and academic backgrounds and lived experiences profoundly influence our professional practices, particularly our work with teacher candidates. We intentionally utilize counter storytelling as a way to describe how our respective work with TCs aligns with particular dimensions in the RM framework. Our findings indicate that our collaborative self-reflections have positively influenced our individual pedagogical practices. We have recognized through our collaborations that we have much to learn from one another to both inform and strengthen our practice as MTEs in ways that put forth a collective commitment to rehumanizing mathematics education for our students and the children they will ultimately teach.

Keywords: Culturally Relevant Pedagogy, Equity, Inclusion, and Diversity, Ethnomathematics, Systemic Change.

Introduction

Author A. As a woman of color, international scholar, a non-native English speaker, and a citizen of a formerly colonized nation, I have experienced firsthand how a conventional math curriculum, implemented in a traditional school setting has become a tool that disadvantages marginalized students, damages their self-esteem, and strips them of agency and identity. I use ethnomathematics as a tool to help learners (re) claim ownership of mathematics, acknowledge cultural funds of knowledge and establish harmony between academic mathematics and out-of-school mathematics.

Author B. I am a privileged white heterosexual female and follower of Jesus Christ and know that I hold a place of privilege and power as a mathematics teacher educator. I take ownership for my conscious and unconscious acts of racism. I realize that my position and power inherently can be a deterrent to BIPOC students unless I provide space for them to bring their whole selves to the classroom and be critical of the social and socio-mathematical norms that continue to be perpetuated in a traditional mathematics classroom.

Author C. As a former mathematics teacher of Black and brown high school students, I have witnessed how cumulative systemic inequalities in mathematics learning and teaching impact many student outcomes including affective outcomes like confidence and math identity, as well as achievement outcomes such as enrollment in advanced math courses, college, and interest in STEM majors. I have had to address their expressions of not seeing themselves in the curriculum or even feeling unseen by their own teachers.

We begin by sharing excerpts that reflect our positionality and its impact on our work as Mathematics Teacher Educators. In this paper, we describe how we disrupt the dominance of near-universal conventional mathematics (NUC) (Bishop, 1990) in mathematics content and methods courses for teacher candidates (TCs). Research reported in this paper is part of a larger project in which we engaged K-8 TCs at a Hispanic-serving Institution in experiences that potentially broadened their perceptions of and vision for mathematics education. Stimulating discussion and action is the goal around this question:

> How do we, as Mathematics Teacher Educators, attempt to rehumanize mathematics in our content and methods courses?

We intend for this collaboration and communication to result in tangible ideas that will add to the current Mathematics Teacher Educator knowledge based on promoting more humanizing practices in mathematics teacher education.

Theoretical Foundations

The philosophical questions, Mathematics for Whom? How? and What? are being repeatedly asked as it dictates what mathematics and whose mathematics is taught and how it is taught (Aguirre, Mayfield-Ingram, & Martin, 2013). Around the world, most schooling dehumanizes mathematics by claiming that mathematics is neutral, and the culture and identities students bring to the classroom should be lost to achieve academically (Paris & Alim, 2017). The research fields of situated cognition (Lave & Wenger, 1991), ethnomathematics (D'Ambrosio, 1985), culturally responsive mathematics education (Gay, 2000, 2018) and critical mathematics education (Frankenstein, 1983; Gutstein, 2006; Skovsmose, 1985) provide the theoretical foundations, research knowledge base, and practical methods to address the central research question.

Adopting these perspectives allows us, as researchers, to challenge dominant and traditionally told narratives about teaching mathematics and about learners in a mathematics classroom. From a practical standpoint, these theoretical constructs enable us to investigate meaningful pedagogical approaches that will empower and transform learners. For a truly transformative mathematics education, we must continue to engage with and support teachers and TCs who are in a position to address the philosophical questions.

As MTEs, we aspire that our instruction will prepare competent and caring teachers who will serve as an advocate for each learner. To make this a reality, we must provide seamlessly structured learning experiences that will enable our TCs to engage in a critical reflection of their beliefs about mathematics and teaching. Equally important is to identify those MTE practices that dehumanize mathematics teaching and learning. Most of the focus for rehumanizing mathematics focuses on what teachers and TCs can do in their classrooms but there has been much less on the practice of MTEs' practice for rehumanizing mathematics. Thus, from an MTE vantage point, we embrace the chosen theoretical perspectives to find commonalities in our work with TCs, creating counter spaces that refine and redefine our goals for mathematics teacher education.

Theoretical Framework

We use rehumanizing mathematics (RM) (Gutiérrez, 2018) as a lens to engage in a critical inquiry of our "selves", and to position and discuss our work. We are drawn to this framework because it provides powerful affordances for weaving funds of knowledge (Gonzalez, Moll &

Amanti, 2005), culturally responsive mathematics (Gay, 2010), ethnomathematics (D'Ambrosio, 1985), and critical mathematics education (Frankenstein, 1983; Gutstein, 2006; Skovsmose, 1985) into the fabric of our scholarship.

This framework includes eight dimensions (Gutiérrez, 2018) (See Figure 1), three of which are most relevant to the work discussed in this paper. *Cultures/ histories* glorifies ethnomathematics as a lens to counter eurocentricism, acknowledge and valorize contributions from learners' funds of knowledge, and attend to the history and evolution of mathematical ideas through non- dominant civilizations and communities. A second facet, *windows and mirrors* allows freedom of access to learners and "see themselves in the [mathematics] curriculum" (Gutiérrez, p. 5). This allows an MTE to provide a space for TCs to explore their relationship with mathematics. TCs draw on their own mathematics learning experiences to investigate their traditionally held beliefs about the teaching and learning of mathematics. *Positioning/participation*, the third feature that we highlight, enables an MTE to recognize the order of class systems in mathematics learning spaces in and out of classrooms and find ways to shift authority and share the space with learners.

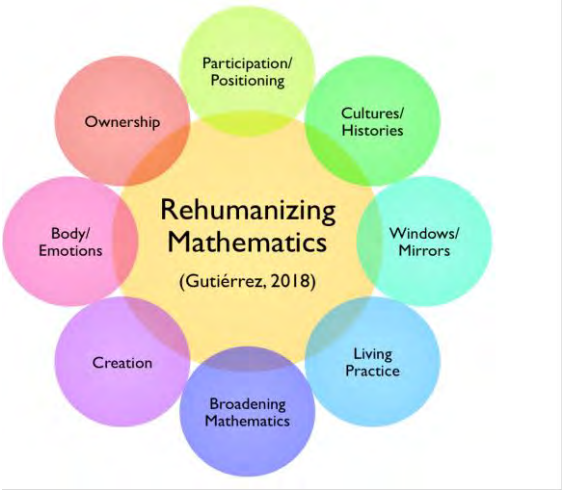

Figure 1: Eight dimensions of Rehumanizing Mathematics (Gutierrez, 2018)

Methodology

We adopt a collaborative self-study (Bullock & Sater, 2017; Lovin et.al., 2012) methodology to frame and situate our work. As Loughran (2004) posits, "There is no one way, or correct way, of doing self-study. Rather, how a self-study might be 'done' depends on what is sought to be better understood" (p. 15). As we engaged in this self-study, we noted similarities in our approaches to present mathematics as a human activity and parallels in our efforts to rehumanize mathematics with our teacher candidates. We engage in a deep reflection of our roles as MTEs in relation to our "selves" and in relation to others. Table 1 provides a general overview of our teaching practices.

Table 1: Author information

Authors	Department	Courses Taught
A	Mathematics	Elementary & Secondary Math content courses
B	Teacher Education	Secondary STEM Methods course
C	Teacher Education	Elementary Math Methods course

Three characteristics define our self-study – collaborative inquiry, contextual knowledge, and a commitment for improving our practice. The traditional research methods of data collection and data analyses are a misfit in our chosen methodology. Instead, we intentionally use a counter storytelling method (Alemán, 2017) to present narratives informed by our personal and professional lived experiences. This method derives from the interpretivist tradition (Walsham, 1993) where researchers advance their work by showcasing "multiple perspectives of stories and who tells the stories," (Creswell, 2007, p. 24). The similarities that we noted in our work led to intriguing stories that we are compelled to share. Our personal and academic backgrounds and lived experiences profoundly influence our dispositions, values, habits of mind, and scholarship and we begin each story by stating our positionality. Next, we describe how our work fits along a particular dimension of the RM framework. The narratives are bound by a common commitment to providing humanizing mathematics learning experiences for our teacher candidates.

Our Stories

Author A's Narrative (cultures/histories)

I am a Mathematics Teacher Educator, and I subscribe to socio-cultural and critical theories of learning. I am also a learner enculturated in a nation subject to centuries of invasion, tyranny, and colonization. This resulted in the suppression of the rich history of Indian mathematics which distorted the philosophy of mathematics and how it is taught and learned (Raju, 2004). My lived experiences and teaching memoirs with diverse learners in K-12 settings and higher education contexts across two continents has illuminated how the near universal conventional curriculum has dominated academic mathematics, treating "mathematical knowledge as being uncontestable, objective, and disassociated from experience, history, and cultures" (Barton, 2008). Math learning experiences in such settings perpetuated among many learners, a narrow perception of and an aversion towards mathematics. Thus, I care deeply about issues of inclusion in mathematics classrooms, particularly for historically marginalized students.

My research interests primarily lie in the field of ethnomathematics which espouses connections between mathematics, culture, and society. From this perspective, I position and discuss my work along the *culture/histories* dimension of the RM framework because of its explicit acknowledgement and attention to the foundational principles of ethnomathematics. I mostly teach mathematics content courses where I have witnessed firsthand how many TCs, particularly those that are marginalized, feel disenfranchised in a math classroom that subscribes to a conventional, near universal math curriculum. Future teachers can learn how to "enhance" and "restore dignity" (D'Ambrosio, 2002) to learners in their classroom by experiencing it themselves. Thus, I deliberately anchor coursework to the principles of ethnomathematics and components of a culturally responsive mathematics education (Gay, 2000) to portray

mathematics as a human activity (Bishop, 1990). These constructs also provide the necessary pedagogical reinforcements and equips me with empathy, consideration, and skills necessary to appreciate all individuals that comprise my classroom community and to see them as capable of learning and doing mathematics.

In many courses that I teach, coursework comprises practical and research components (Naresh & Kasmer, 2018). As part of the practical component, each week, TCs participate in at least one content exploration activity set in a social/cultural/historical/political context. For instance, as part of content explorations, I designed a pattern investigation activity based on the tradition of Kolam, an artform that has been practiced for many centuries by the women of the household in Tamilnadu (Ascher, 2002). By highlighting connections between mathematics and my own culture and by placing the spotlight on the mathematics of Kolam-drawing women, we develop an appreciation of the diversity and respect of cultural heritages, thus supporting the belief that all people are capable of doing mathematics. The research component requires TCs to complete a mathematics and culture project in which they partner with a community member to identify out-of-school activities that have a potential to transform into rich mathematical tasks (Naresh, Goodson-Espy & Poling, 2017). TCs use communal knowledge to frame problems that are central to their lived experiences, classical knowledge to develop mathematical competencies, and critical knowledge to gain a comprehensive understanding of the sociopolitical context for the problem (Gutstein, 2006). We adopt a socio-critical modeling approach in conjunction with Gutstein's 3-C framework that provides an "emancipatory perspective" [that] leads to a critical understanding of the surrounding world" (Kaiser & Sriraman, 2006, p. 304).

Author B's Narrative (participation/positioning)

My conscious journey to transform my instructional space to be culturally relevant (LadsonBillings, 1995) began while teaching a secondary STEM methods course about six years ago. A critical review and reflection of my own teaching revealed that I did not know the K-12 mathematics and sciences experiences and identities of the teacher candidates (Aguirre et al, 2013). During this time, I became conscious and acknowledged my privilege for identifying as a white heterosexual female and follower of Jesus Christ (DiAngelo, 2018). As a result, I hold a place of privilege and power as a mathematics teacher educator. For this reason, I chose the *participation/positioning* dimension of rehumanizing mathematics (Gutiérrez, 2018).

First, I needed to acknowledge my own upbringing in a single parent non-Christian home where I experienced both poverty and wealth. At home, my mom and maternal grandmother shared stories of our Indigenous heritage, but we have no record or connections to our Indigenous tribe. At school, I did not share my heritage but sought to fit in. My mathematical experiences were initially impeded by my dyslexia. In eighth grade was when I first recall experiencing agency in mathematics. Now I seek to support teacher candidates in giving agency and power to the students they will teach. My position and power inherently can be a deterrent to BIPOC teacher candidates unless I provide space for them to bring their whole selves to the classroom and be critical of the social and socio-mathematical norms that continue to be perpetuated in a traditional mathematics classroom. Next, are examples of activities in STEM and mathematics methods courses.

In the secondary STEM methods course, equity and diversity became a thread throughout the course rather than finite topics covered in the semester. Virtual anonymous discussions embedded in the course beginning with candidates writing their STEM autobiography and other

discussion such as how their culture was an advantage and disadvantage. The anonymous post to each other gave teacher candidates a voice and space to share what they would not share with one another. In the middle grades mathematics methods course, teacher candidates chose to lead in *Number Talks* (Parrish & Dominick, 2016; Sun, Baldinger, & Humphreys, 2018) or keeping a log of what occurred in class. Everyone signed up once for a particular class for posting to the class Twitter about what they saw as worthwhile for sharing with the teacher community. My thinking was that by including Number Talks as part of our weekly routine, the position of teacher candidates would be us rather than me and them. In the elementary mathematics methods course, teacher candidates also lead Number Talks (Parrish & Dominick, 2016), but rotated in Quick Draw (Wheatley, 2007), and mathematics literacy during the semester too. Instead of Twitter, students reflect weekly through the course webpage on what was the highlight of their learning.

What I continue to find difficult is that I am ultimately seen as the person with authority/power who gives grades that account toward their progress in the teacher preparation program. Ideally, I would like the work we do together to be intrinsically motivating rather than what is needed for the 'A'. By having a component of the grading system for weekly engagement, I can capture in the moment and reflect on the participation and positioning of teacher candidates.

Author C's Narrative (mirrors/windows)

I am an Afro-Caribbean mathematics teacher educator with a positive mathematics identity that was developed largely due to the influence and encouragement of K-12 teachers who always made me feel capable in mathematics. My positionality towards my work with elementary preservice teachers stems from my converging identities as a former high school mathematics teacher at a Title I school, mother to two elementary aged Black boys, and mathematician. In my research I investigate the nuanced ways that inequity occurs in the mathematics learning of children from racially minoritized groups. Furthermore, in my work with PSTs, I am most interested in facilitating the evolution of their critical consciousness (Ladson-Billings, 1995) and investigating the varied ways that this evolution can occur. Due to systemic injustices, including racism, that have been illuminated during the global pandemic, it is especially important that preservice teachers have opportunities to be self-reflective and explore sensitive topics that may have impacted their own mathematics learning experiences and those of the children they will teach (Gay & Kirkland, 2003).

Through my research, as well as my lived experiences, I am aware of how cumulative systemic inequalities in mathematics learning and teaching impact many student outcomes including affective outcomes like confidence and math identity (Riegle-Crumb, Morton, Nguyen, & Dasgupta, 2019) as well as achievement outcomes such as enrollment in advanced math courses, college, and interest in STEM majors (Madkins & Morton, 2021). I am always striving to center the lived experiences of my TCs (especially those of Color) in my elementary math methods courses as a means to illuminate, confront and expose past traumas in mathematics learning in an attempt to interrupt reproduction of those traumas. I value my work with elementary preservice teachers. Through this work I am able to directly influence and contribute to mathematics teacher education that centers equity and antiracism in math methods courses.

Recognizing that our PSTs are the future teachers of racially minoritized children traditionally underserved and marginalized in math classrooms, children much like my own two boys, adds a certain level of urgency to my work. However, I couple this urgency with critical grace (Amidon et al, 2020) recognizing that this process should be an intentional and continuous one.

In my elementary mathematics methods course, I strive to create a space for PSTs to reflect on their own experiences learning mathematics and have explicit discussions about the common inequities that exist in mathematics learning and teaching. When delving into the dimension of *mirrors/windows*, I engage TCs in a number of activities that stem from the math autobiography assignment (Aguirre, Mayfield-Ingram, Martin, 2013) where students tell their mathematical story, recounting their in-school and out-of-school learning experiences with mathematics. As they answer several question prompts, TCs describe specific moments in their elementary mathematics learning. Following this we spend time unpacking those autobiographies through 2 in class activities: word cloud and math corners activity (Ward, 2020). The dimension *mirrors/windows* allows TCs a space for exploring their relationship with mathematics as well as "seeking to understand themselves and others in relationship" (Gutiérrez, 2018). Both activities are intended to illuminate the commonalities and differences in the TCs' mathematics learning experiences and begin to have discussions around those patterns. The RM framework allows us as MTEs to address inequitable opportunities to learn mathematics for children traditionally marginalized in math classrooms by highlighting these same inequities in the learning experiences of those who are becoming teachers themselves, teacher candidates.

Impacts of Our Collective Work on our Individual Practice

In this paper, we shared findings from a collaborative self-study that traced the collective journey of a team of MTEs. We used three dimensions of the RM framework to situate and integrate our work across mathematics content and methods courses. As MTEs, we along with our teacher candidates are the needed change to create more humanizing and socially just contexts for learning and teaching mathematics. Our collaborative self-reflections have begun to deeply influence our individual practices as mathematics teacher educators. We each have particular strengths developed through our lived experiences, both personal and professional, that we draw from in our collaborative work. For instance, while we are all mathematics teacher educators, one of us is the sole MTE faculty in the mathematics department unlike the other two MTEs who are faculty in a teacher education department. This difference presents the opportunity for conversations around the pedagogical challenges commonplace within many mathematics departments that are in direct opposition to the dehumanizing practices that undergird our work. Similarly, our identities as female mathematicians intersected with our racial/ethnic identities further inform our collective understandings around privilege, oppression, and equity in mathematics education as they relate to our own mathematics learning experiences in schools, as well as our individual work with teacher candidates. We have recognized through our collaborations that we have much to learn from one another to both inform and strengthen our practice as MTEs in ways that put forth a collective commitment to rehumanizing mathematics education for our students and the children they will ultimately teach.

Conclusion

Together, we reflect on our own math learning experiences and recall instances when we felt a sense of joy, pride, and belonging, and discover ways to re-experience those in our courses. Mathematics teacher education courses must offer a space for transformative learning experiences "not only for how students understand their abilities in mathematics but also in how they understand their relationship to others in the world" (Staats, 2006, p. 41). Our work with TCs, which we have presented using the lens of RM, has enabled us to challenge myths such as a) meaningful math cannot exist when we engage students in non-traditional math activities, b)

math knowledge is mostly generated within the walls of the academy, and c) "just plain folks" are credible sources of knowledge and are able to demonstrate the use of more sophisticated mathematics. This work is rewarding and challenging at once; as a collective, we are presenting a counter-narrative to the dominant perspective that has permeated mathematics education. We believe in the potential this work holds for transforming the landscape of mathematics education and mathematics teacher education. Concomitantly, we must continue to engage in a critical inquiry of our own biases, assumptions, and teaching practices to become advocates for and to provide more empathetic mathematics learning experiences for TCs. In our future work, we intend to be critical friends (Ragoonaden & Bullock, 2016) to one another, utilizing both formal (e.g., required annual peer observations) and informal means to provide feedback to one another in ways that advance our collective agenda.

Our collaboration has resulted in an emerging Community of Practice (CoP) (Lave & Wenger, 1991) within our institution focused on providing more streamlined and humanizing learning experiences for TCs. We hope that this work will spark interest among other likeminded MTEs beyond our institutional context, broaden participation, and strengthen our CoP. In addition, from a research standpoint, it will enable us to a) investigate ways in which we can encompass additional dimensions of RM in our work, b) continue to present counter narratives to empower TCs that are marginalized in mathematics learning spaces and c) contribute to a collective repertoire of knowledge on MTE professional development centered on rehumanizing mathematics.

References

Aguirre, J., Mayfield-Ingram, K., & Martin, D. (2013). The impact of identity in K-8 mathematics: Rethinking equity-based practices. Reston, VA: National Council of Teachers of Mathematics.

Alemán, S. M. A Critical race counterstory: Chicana/o subjectivities vs. Journalism objectivity. Taboo: The Journal of Culture and Education 16(1). https://doi.org/10.31390/taboo.16.1.08

Amidon, J., Marshall, A. M., & Smith, R.(February, 2020). Grace in Learning: A Necessary Condition of Equitable Practices in the Mathematics Classroom. Session at annual conference of the Association for

Mathematics Teacher Educators. Phoenix, AZ

Ascher, M. (2002). The Kolam Tradition: A tradition of figure-drawing in southern India expresses mathematical ideas and has attracted the attention of computer science. American Scientist, 90(1), 56–63. http://www.jstor.org/stable/27857597

Barton, B. (2008). The language of mathematics: Telling mathematical tales. New York, NY: Springer.

Bishop, A. J. (1990). Western mathematics: the secret weapon of cultural imperialism. Race and Class, 32 (2), 5165. Bullock, S. M., & Sator, A. (2018) Developing a Pedagogy of "Making" through Collaborative Self-Study, Studying

Teacher Education, 14(1), 56-70, DOI: 10.1080/17425964.2017.1413342

Creswell, J. W. (2007). Qualitative inquiry and research design: Choosing among five approaches. Thousand Oaks, CA: Sage.

D'Ambrosio, U. (1985). Ethnomathematics and its place in the history and pedagogy of mathematics. For the Learning of Mathematics, 5, 44-48.

D'Ambrosio, U. (2002). Ethnomathematics: an overview. Proceedings of the II Congresso Internacional de Etnomatematica, Ouro Preto, Brazil.

DiAngelo, R. (2018). White fragility: Why it's so hard for white people to talk about racism. Beacon Press. Frankenstein, M. (1983). Critical mathematics education: An application of Paulo Freire's epistemology. Journal of

Education, 165(4), 315–339. https://doi.org/10.1177/002205748316500403

Gay, G. (2010). Culturally responsive teaching: Theory, practice, & research. New York: Teachers College Press Gay, G., & Kirkland, K. (2003). Developing cultural critical consciousness and self-reflection in preservice teacher education. Theory into practice, 42(3), 181-187.

Gonzalez, N., Moll, L. & Amanti, C. (2005) Funds of Knowledge: Theorising Practices in Households, Communities, and Classrooms. Mahwah, NJ, Lawrence Erlbaum Associates.
Gutstein, E. (2006). Reading and writing the world with mathematics: Toward a pedagogy for social justice.
Routledge, New York.
Gutiérrez, R. (2018). Introduction. In Goffney, I., Gutiérrez, R., & Boston, M. (Eds.). Rehumanizing mathematics for Black, Indigenous, and Latinx students, (pp. 1-10). National Council of Teachers of Mathematics.
Kaiser, G., & Sriraman, B. (2006). A Global Survey of International Perspectives on Modeling in Mathematics Education. ZDM - The International Journal on Mathematics Education, 38(3), 302-310.
Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy. Theory into practice, 34(3), 159-165.
Lave, J., & Wenger, E. (1991). Situated learning: Legitimate peripheral participation. Cambridge: Cambridge University Press.
Loughran, J. J. (2004). A history and context of self-study of teaching and teacher education practices. In J. J. Loughran, M. L. Hamilton, V. K. LaBoskey, & T. Russell (Eds.), International handbook of self-study of teaching and teacher education practices (pp. 7–39). Dordrecht, The Netherlands: Springer.
Lovin, L. H., Sanchez, W. B., Leatham, K. R., Chauvot, J. B., Kastberg, S. E., & Norton, A. H. (2012). Examining beliefs and practices of self and others: Pivotal points for change and growth for mathematics teacher educators. Studying Teacher Education, 8(1), 51-68. doi:10.1080/17425964.2012.657018.
Madkins, T.C., Morton, K. (2021). Disrupting anti-blackness with young learners in STEM: Strategies for elementary science and mathematics teacher education. Canadian Journal Science, Mathematics and Technology Education, 21, 239–256. https://doi.org/10.1007/s42330-021-00159-1
Morton, K., & Riegle-Crumb, C. (2019). Who gets in? Examining inequality in eighth-grade algebra? Journal for Research in Mathematics Education, 50 (5), 529-544.
Naresh., N., Goodson-Espy, T., & Poling, L. (2017). Using CME to Empower Prospective Teachers (and Students) emerge as Mathematica Modellers. Proceedings of the 9th International Conference of Mathematics, Education, and Society, Volos, Greece.
Naresh, N., & Kasmer, L. (2018). Using ethnomathematics perspective to widen the vision of mathematics teacher education curriculum. In Bartell, T, G., (Ed.), Toward Equity and Social Justice in Mathematics Education, Research in Mathematics Education Series, Springer.
Paris, D., & Alim, H. S. (2017). Culturally sustaining pedagogies: Teaching and learning for justice in a changing world. New York : Teachers College Press.
Parrish, S., & Dominick, A. (2016). Number talks: Fractions, decimals, and percentages. Math Solutions.
Ragoonaden, K., & Bullock, S. (2016). Critical friends: The practiced wisdom of professional development. In K.
Ragoonaden & S. Bullock (Eds.), Mindfulness and critical friendship: A new perspective on professional development for educators (pp. 13–32). Lexington Books.
Raju, C. K. (2004). Math wars and the epistemic divide in mathematics. Proceedings of Episteme I, Homi Bhabha Center for Science Education, Mumbai, India.
Riegle-Crumb, C., Morton, K., Nguyen, U., & Dasgupta, N. (2019). Inquiry-based instruction in science and mathematics in middle school classrooms: Examining its association with students' attitudes by gender and race/ethnicity. AERA Open, 5(3).
Skovsmose, O. (1985). Mathematical education versus critical education. Educational Studies in Mathematics. 16, 337--354.
Staats, S. (2006). The case for rich contexts in ethnomathematics lessons. The Journal of Mathematics and Culture, V1(1), 39-56.
Sun, K. L., Baldinger, E. E., & Humphreys, C. (2018). Number talks: Gateway to sense making. The Mathematics Teacher, 112(1), 48-54.
Walsham, G. (2006). Doing interpretive research. European Journal of Informative Systems. 15, 320–330 https://doi.org/10.1057/palgrave.ejis.3000589
Ward, J. (2020). The Road You Traveled: Reexamining PSTs Experiences to Talk About the Sociopolitical Nature of Math. Session at annual conference of the Association for Mathematics Teacher Educators.
Phoenix, AZ.
Wheatley, G. (2007). Quick draw. Mathematics Learning: Bethany Beach, DE, USA.